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NOTES ON THE  
**Aquatic Phenogams of Iowa.**

By R. I. CRATTY.

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## NOTES ON THE AQUATIC PHENOGRAMS OF IOWA.

BY R. I. CRATTY.

So large a proportion of our state is suitable for cultivation that our native flora is being rapidly swept away, and while most of the species may survive along roadsides, in hilly and stony localities, and along streams, yet many which are rare or local must eventually disappear entirely. Most of the land too rolling for plowing is valuable for pasturage, and here the destruction of the indigenous flora is nearly as rapid, the introduced grasses, clovers, and weeds appropriating the ground. While the marsh and aquatic plants have a better chance in the struggle for existence than the prairie flora, yet the draining of ponds and marshes, thus greatly restricting the area frequented by such plants, is certain to sweep away some species which were formerly quite common. Those who have lived many years in the state, now see the former haunts of muskrats and aquatic birds covered with waving grain, and while from an economic point of view this change may be desirable, yet to the naturalist it brings the conviction that if we are to secure a full representation of what our flora was, there is no time to lose.

The following list of plants, all marsh or aquatic except our two species of *Arisæma*, while probably not complete, is an attempt to record in one paper a list of the species of the following orders found within our limits, giving as far as possible the geographical distribution of each. Free use has been made of Dr. Arthur's *Flora of Iowa* (1876), and of its several additions, and of Prof. A. S. Hitchcock's *Ames Flora*, as published in the *Transactions of the St. Louis Academy of Science*,

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Vol. V. (1891). Much help has also been derived from Prof. Macmillan's *Metaspermæ of the Minnesota Valley* (1892). Dr. Morong's *Naiadaceæ of North America* and J. G. Smith's *Revision of the North American Species of Sagittaria* and *Lophotocarpus* have been followed in those groups. In the remaining portions the treatment, with a few exceptions, is essentially that of *Gray's Manual*, 6th edition.

Thanks are due Dr. J. C. Arthur, of Purdue University, Lafayette, Indiana, Mr. E. W. D. Holway, of Decorah, Iowa, Prof. A. S. Hitchcock, of the Kansas Agricultural College, Edmund P. Sheldon, of the University of Minnesota, and Prof. B. Shimek, of the Iowa State University, for valuable assistance. Mr. F. Reppert, of Muscatine, Iowa, has greatly aided me by the loan of specimens, literature, and by furnishing many valuable notes. Prof. W. A. Kellerman, of the Ohio State University, kindly looked over for me a portion of Dr. Arthur's collection now in the herbarium of the late Dr. Townshend. Prof. L. H. Pammel, of the Iowa Agricultural College, kindly loaned me for study the collection of Iowa aquatics in the herbarium of that institution. Finally, I desire to thank Prof. T. H. Macbride, of the Iowa State University, for his kindness and the efficient aid he has rendered me in many ways.

## ARACEÆ.

ARISÆMA Mart. Flora, II., 459 (1831).

I. A. TRIPHYLLUM (*Linn.*) *Torr.* Fl. N. Y., II., (1843).

Wats. and Coult., *Gray's Man.*, 6th ed., 549; Arthur, Fl. Iowa, 30; Hitchcock, *Ames Fl.*, 521; Macmillan, *Metas. Minn. Val.*, 132.

Common throughout; preferring low, rich ground in woods. Flowering in May or June, the fruit maturing late in August.

Decorah, *Holway*; Iowa City, *Macbride*; Ames and Charles City, *Arthur*; Emmet county, *Cratty*; Le Claire, *Rolfs*; Muscatine, *Reppert*; Winnebago county, *Shimek*.

2. *A. DRACONTIUM* (*Linn.*) *Schott.* Melet. (1832).

Wats. and Coult., Gray's Man., 6th ed., 549; Upham, Fl. Minn., 134; Arthur, Fl. Iowa, 30; Hitchcock, Ames Fl., 521.

Low damp woods; less common than the preceding species.

Decorah, *Holway*; Ames, *Hitchcock*; Iowa City, *Macbride*; Charles City, *Arthur*; Muscatine, *Reppert*; Keokuk, *Rolfs*.

NOTE.—*Calla palustris* Linn., Spec. Ed. 2, 1373 (1762), has been found just outside our limits in southeastern Minnesota. It may be looked for in the northeastern part of our state.

SYMPLOCARPUS *Salisb.* Nutt., Gen. I., 105 (1818).1. *S. FÆTIDUS*. *Salisb.* Nutt., Gen. I., 105 (1818).

Wats. and Coult., Gray's Man., 6th ed., 551; Arthur, Fl. Iowa, 30; Macmillan, Metas. Minn. Val., 131.

A homely plant with a most disagreeable odor. Bogs and very moist ground; eastern and southern portions of the state. Rather rare.

Decorah, *Holway*; Muscatine county, *Macbride*, *Reppert*.

ACORUS *Linn.* Spec. Pl. (1753).1. *A. CALAMUS* *Linn.* Spec. Pl. 324 (1753).

Wats. and Coult., Gray's Man., 6th ed., 551; Arthur, Fl. Iowa, 30; Upham, Fl. Minn., 135.

Well distributed throughout the state. Usually only a small percentage of the plants flower. Marshes, June, July.

Decorah, *Holway*; Iowa City and Cedar Rapids, *Macbride*; Emmet county, *Cratty*; Ames, *Hitchcock*; Hancock county, *Arthur*; Jewell Junction, *Rolfs*; Winnebago county, *Shimek*.

## LEMNACEÆ.

LEMNA *Linn.* Spec. Pl., (1753).1. *L. MINOR* *Linn.* Spec. Pl. 970 (1753).

Wats. and Coult., Gray's Man., 6th ed., 553; Arthur, Fl.

Iowa, 30; Hitchcock, Ames Fl., 522; Macmillan, Metas. Minn. Val., 133.

Proliferous like the rest of our *Lemnaceæ*, the flowers and fruit being rarely seen. In stagnant water; rarer than the two following.

Ames and Iowa City, *Hitchcock*; Marshalltown, *Stewart*; Muscatine, *Reppert*; Linn county, *Shimek*; Ames (near the var. *orbiculata* Austin), *Bessey*.

2. *L. TRISULCA* Linn. Spec. Pl., 970 (1753).

Wats. and Coult., Gray's Man., 6th ed., 552; Arthur, Fl. Iowa, 30; Hitchcock, Ames Fl., 522; Upham, Fl. Minn., 135.

Common throughout the state, floating on stagnant water, among other vegetation, often in dense mats. June, July.

Emmet county, *Cratty*; Iowa City and Cedar Rapids, *Macbride*; Decorah, *Holway*; Ames, *Arthur*, *Bessey*; Spirit Lake, *Hitchcock*; Muscatine, *Reppert*; Hancock county, *Shimek*.

3. *L. POLYRRHIZA* Linn. Spec. Pl., 970 (1753).

*Spirodela polyrrhiza* Schleid, Linneæ, XIII., 392 (1839).

Wats. and Coult., Gray's Man., 6th ed., 552; Arthur, Fl. Iowa, 30; Hitchcock, Ames Fl., 521; Macmillan, Metas. Minn. Val., 134.

Very common throughout, floating on stagnant or slow flowing water. July.

Muscatine, *Reppert*; Spirit Lake, *Hitchcock*; Ames, *Arthur*; Decorah, *Holway*; Cedar Rapids and Iowa City, *Macbride*; Emmet county, *Cratty*; Winnebago county, *Shimek*.

NOTE.—*L. perpusilla* Torr., Fl. N. Y., II., 245 (1843), should be looked for in the eastern part of the state.

*WOLFIA* Horkel. Linn. XIII., 389 (1839).

1. *W. BRASILIENSIS* Wedd. Ann. Sci. Nat. Ser., 3, XII., 157 (1849).

*Grantia brasiliensis* (Wedd.) Macmillan, Metas. Minn. Val., 134 (1892).

Wats. and Coult., Gray's Man., 6th ed., 553; Upham, Fl. Minn., 135; Beal and Wheeler, Fl. Mich., 144.

Floating as little grains on the surface of the water.

Iowa City and Cedar Rapids, where it is very common some years, *Macbride*, *Shimek*; Mississippi River near Oquawka, Ill., *Patterson*; Muscatine, *Reppert*.

### TYPHACEÆ.

TYPHA *Linn.* Spec. Pl., (1753).

1. T. LATIFOLIA *Linn.* Spec. Pl., 971 (1753).

Wats. and Coult., Gray's Man., 6th ed., 547; Arthur, Fl. Iowa, 30; Hitchcock, Ames Fl., 521; Macmillan, Metas. Minn. Val., 31.

A well known plant of wide distribution throughout the northern hemisphere. Fertile portion of spike when mature often 1 in. or more in diameter, and 5 to 8 in. long. Common in marshes and edges of ponds. July, August.

Decorah, *Holway*; Iowa City, *Macbride*; Emmet and Kosuth counties, *Cratty*; Ames, *Arthur*, *Hitchcock*; Hamilton county, *Rolfs*; Muscatine, *Reppert*; Charles City, *Arthur*; Cedar Rapids, Keokuk, Taylor county, *Shimek*; Henry, Scott, Delaware, Jackson counties, *Macbride*.

### SPARGANIACEÆ.

SPARGANIUM *Linn.* Spec. Pl. (1753).

1. S. SIMPLEX *Huds.* Fl. Angl. Ed. 2, 401 (1762).

*S. simplex* Huds. var. *nutallii* Englm. in Gray's Man., 5th ed., 481 (1867).

Wats. and Coult., Gray's Man., 6th ed., 548; Arthur, Fl. Iowa, 30; Hitchcock, Ames Fl. 521; Upham, Fl. Minn., 135.

Marshes and edges of lakes; rare or local. July, August.

Ames, four miles southwest of College, *Hitchcock*.

2. *S. ANDROCLADUM* (*Engelm.*) *Morong, Bull. Torr. Bot. Club*, XV., 78 (1888).

*S. simplex* Huds. var. *androcladum* Engelm. in Gray's *Man.*, 5th ed., 481 (1867).

Wats. and Coult., Gray's, *Man.* 6th ed., 548; Arthur, *Fl. Iowa*, 30; Macmillan, *Metas. Minn. Val.*, 33.

Heads when mature about one inch in diameter, being intermediate in size between the preceding and the next. Ponds; rare. July, August.

Davenport, *Arthur's Fl. Iowa*, No. 775; Wilton, *Hitchcock*.

3. *S. EURYCARPUM* *Engelm.* Gray's *Man.*, 2nd ed. (1852).

Wats. and Coult., Gray's *Man.*, 6th ed., 548; Arthur, *Fl. Iowa*, 30; Hitchcock, *Ames Fl.* 521; Macmillan, *Metas. Minn. Val.*, 33.

Frequent throughout the state on the margin of ponds and lakes, usually being found among a rank growth of grasses and sedges. Mature heads of fruit are often 1½ in. in diameter. July, August.

Emmet county, *Cratty*; Iowa City, *Macbride*; Ames, *Hitchcock*; Humboldt, *Bessey*; Hamilton county, *Rolfs*; Dickinson county, *Hitchcock*; Washington and Winnebago counties, Cedar Rapids, *Shimek*.

## NAIADACEÆ.

*NAIAS* *Linn.* *Spec. Pl.*, 1015 (1753).

1. *N. FLEXILIS* (*Willd.*) *Rost. & Schmidt, Fl. Sed.* 384 (1824).

*Morong, Naiad. N. A.*, 59; Wats. and Coult., Gray's *Man.*, 6th ed., 566; Macmillan, *Metas. Minn. Val.*, 40; Hitchcock, *Ames Fl.*, 523; Arthur, *Fl. Iowa*, 30.

A homely little plant, growing entirely under water, and widely distributed throughout the northern hemisphere. Ponds and slow streams. July, August.

Lake Cairo, *Bessey*; Emmet county, *Cratty*; Story and Dickinson counties, *Hitchcock*; Muscatine *Reppert*; Hancock county, *Shimek*.

ZANNICHELLIA *Linn.* Spec. Pl., 969 (1753).1. Z. PALUSTRIS *Linn.* Spec. Pl., 969 (1753).

Morong, Naiad., N. A. 57; Wats. and Coult., Gray's Man., 6th ed., 565; Arthur, Fl. Iowa, 30; Hitchcock, Ames Fl., 523; Upham, Fl. Minn., 136.

A graceful aquatic with capillary stems, sparsely branched; flowering and ripening its fruit under water. Cosmopolitan. Ponds, and slow streams.

Ames, not uncommon, *Hitchcock*; Muscatine, *Reppert*; Storm Lake, *Bessey*.

POTAMOGETON *Linn.* Spec. Pl., 126 (1753).1. P. NATANS. *Linn.* Spec. Pl., 126 (1753).

Morong, Naid. N. A. 13; Wats. and Coult., Gray's Man., 6th ed., 558; Arthur, Cont. Fl. Iowa, III.; Macmillan, Metas. Minn. Val., 34.

Ponds and slow-flowing streams; fruit maturing in August which should be especially collected of all species of the genus.

Lake township, Muscatine county, *Reppert*; Linn county, *Shimek*; Lake Okoboji and Fort Dodge, *Hitchcock*.

2. P. AMPLIFOLIUS *Tuck.* Am. Jour. Sci., 2, VI., 225 (1848).

Morong, Naiad. N. A., 16; Wats. and Coult., Gray's Man., 6th ed., 561; Upham, Fl. Minn., 136; Arthur, Fl. Iowa, 30; Beal and Wheeler, Fl. Mich., 146.

Slow flowing streams; rather rare.

Emmet county, *Cratty*; Muscatine, *Reppert*; Spirit Lake, *Hitchcock*; Tama County, *Sirrinc*; Charles City, *Arthur*.

3. P. NUTTALLII *Ch. & Sch.* Linnæa, II., 226 (1827).

*P. pennsylvanicus* Ch. & Sch. Linn., II., 227 (1827).

*P. claytonii* Tuck. Am. Jour. Sci. and Arts. 1st Ser., XLV., 38 (1843).

Morong, Naiad. N. A., 18; Wats. and Coult., Gray's Man., 6th ed., 559; Beal and Wheeler, Fl. Mich., 145.

Not before reported from Iowa. Ponds and slow streams along Cedar River near Muscatine, June 25, 1894. Not common. *Herb. Reppert*, No. 738.

4. *P. LONCHITES* *Tuck.* Am. Jour. Sci. and Arts, 2nd Ser., VII., 348 (1849).

*P. fluitans* Auc. Amer.

(?) *P. fluitans* Roth, Fl. Germ., I., 72 (1788).

Morong, Naiad. N. A., 20; Wats. and Coult., Gray's Man., 6th ed., 560; Macmillan, Metas. Minn. Val., 34; Arthur, Fl. Iowa, 30.

Slow-flowing streams; common. Forms of this species with the petioles of the submerged leaves 6 to 8 in. long were collected by Mr. Reppert in the Mississippi River near Muscatine.

West Fork of the Des Moines at Estherville, *Cratty*; Ames, streams around Cairo Lake, *Hitchcock*; ponds and sloughs along Cedar River, *Reppert*; Iowa City, Linn and Lee counties, *Shimek*; Charles City, *Arthur*; Storm Lake, *Bessey*; Waterloo and Spirit Lake, *Hitchcock*; Hamilton county, *Rolfs*.

5. *P. HETEROPHYLLUS* *Schreb.* Spic. Fl. Lips, 21 (1771).

*P. gramineus*, var. *heterophyllus* Fries. Nov. 2nd ed., 35 (1828).

Morong, Naiad. N. A., 23; Wats. and Coult., Gray's Man., 6th ed., 561; Hitchcock, Ames Fl., 522; Macmillan, Metas. Minn. Val., 35.

An extremely variable species, preferring quiet water; rare within our limits. When the ponds and sloughs dry up this species often sends up shoots bearing several broad green leaves, in this respect resembling *P. illinoensis*.

Sloughs near Armstrong, Emmet county, *Cratty*; Ames, rare, *Hitchcock*.

6. *P. ILLINOENSIS* *Morong.* Bot. Gaz., V., 50 (1880).

Morong, Naiad. N. A., 27; Wats. and Coult., Gray's Man., 6th ed., 561; Macmillan, Metas. Minn. Val., 36; Arthur, Cont. Fl. Iowa, V.; Hitchcock, Ames, Fl., 522.

Ponds and margins of lakes. This species has the floating leaves more crowded and of a stockier growth than *P. lonchites* with which it is often confounded. "The plant confines itself mostly to rather shallow water on the margin of sloughs and ponds. The plants are often left exposed in the mud, in which, if it does not become too dry, the roots survive and produce short shoots bearing 3 to 4 leaves."—*Reppert*.

Emmet county, rare, *Cratty*; Ames, infrequent, *Hitchcock*; Muscatine, the most common of the large-leaved species, *Reppert*.

7. *P. PRÆLONGUS* *Wulfen*. Roem. Arch., III., 331 (1803-5).

Morong, Naiad. N. A., 32; Wats. and Coult., Gray's Man., 6th ed., 562; Upham, Fl. Minn., 136; Arthur, Fl. Iowa, 30; Beal and Wheeler, Fl. Mich., 146.

Deep water, lakes and ponds. July, August.

Clear Lake, *Arthur*; Okoboji and Spirit Lakes, *Hitchcock*; Iowa Lake, *Cratty*.

NOTE.—*P. lucens* Linn. Spec. Pl., 126 (1753). Specimens without flowers or fruit of what appears to be this species were collected by Professor Hitchcock near Ames and are in the herbarium of the Agricultural College.

8. *P. PERFOLIATUS* *Linn.*, var. *RICHARDSONII* *A. Bennett*. Jour. Bot., XXVII., 25 (1889). <sup>not</sup>*P. lanceolatus* Sm. Eng. Bot., 1985 (1808). *P. perfoliatus* var. *lanceolatus* Robbins in Gray's Man., 5th ed., 488 (1867).

Morong, Naiad. N. A., 33; Wats. and Coult., Gray's Man., 6th ed., 562; Arthur, Cont. Fl. Iowa, V.; Upham, Fl. Minn., 137.

Shallow water in lakes, ponds, and streams — a most beautiful plant. July. I have not seen the typical *P. perfoliatus* from Iowa.

Okoboji and Spirit Lakes, *Hitchcock*; Emmet county, *Cratty*.

9. *P. ZOSTERÆFOLIUS* *Schum.* Enum. Pl. Sael, I., 50 (1801), *P. compressus* Fries. Nov. ed. 2, 44 (1828), non Linn.

Morong, Naiad. N. A., 37; Wats. and Coult., Gray's Man., 6th ed., 562; Macmillan, Metas. Minn. Val., 39; Arthur, Cont. Fl. Iowa, III.; Hitchcock, Ames, Fl., 522.

A beautiful plant with bright, smooth leaves. Shallow water in lakes or slow streams. July, August.

Vinton, *Arthur's Cat.*; Iowa Lake, Emmet county, *Cratty*; Lake Okoboji and Ames, *Hitchcock*; Muscatine, *Reppert*; Cedar Rapids, Iowa City, Hancock county, *Shimek*.

10. *P. FOLIOSUS* Raf. Med. Rep., II., Hex. V., 354 (1808).  
*P. pauciflorus* Pursh. Fl. Am., I., 121 (1814), non Lam.  
 Fl. Franc, III., 209 (1778).

Morong, Naiad. N. A., 39; Wats. and Coult., Gray's Man., 6th ed., 563; Arthur, Fl. Iowa, 30; Macmillan, Metas. Minn. Val., 39.

A very variable species, usually growing entirely under water, and widely distributed throughout the United States and Canada. Morong in his *Naiadaceæ of North America* says, "spikes about 4-flowered." Emmet county, Iowa, specimens determined by him have the spikes 4- to 6-fruited. Some of Mr. Reppert's specimens vary from the type in having the spikes 6- to 10-fruited, in this respect approaching the var. *niagarensis* (Tuck.) Gray. Similar forms were also collected at Ames by Prof. Hitchcock. June, July.

Shallow water in ponds and lakes, Emmet county, *Cratty*; Muscatine, *Reppert*; Iowa City, Lee, Hancock, and Linn counties, *Shimek*; Mt. Pleasant, *Mills*; Charles City, *Arthur*; Grand Junction, *Bessey*; Dickinson and Woodbury counties, *Hitchcock*.

NOTE.—*P. obtusifolius* Mert. and Kock. Deut. Fl., I., 855 (1823), has been reported from this State, but I have not seen it. Plants so labeled which I have seen are forms of another species.

11. *P. MAJOR* (*Fries*) Morong, Naiad. N. A., 41 (1893).  
*P. rutilus* Auc. Amer. in part, non Schult., Mant. III., 362 (1827).  
*P. pusillus* Linn., var. *major* Fries. Nov. 48 (1828).  
*P. compressus* Sm. Eng. Bot., III., 418 (1794), non Linn.

Morong, Naiad. N. A., 41; Wats. and Coult., Gray's Man., 6th ed., 563; Upham, Fl. Minn., 137.

A graceful little plant with delicate, bright foliage, somewhat resembling *P. pusillus* but larger. Rare in America. Ponds and shallow lakes. July.

Iowa Lake, Emmet county, *Cratty*; Muscatine, *Herb. Reppert*, No. 746 in part; Spirit Lake, *Hitchcock*.

12. *P. PUSILLUS* Linn. Spec. Pl., 127 (1753).

Morong, Naiad. N. A., 45; Wats. and Coult., Gray's Man., 6th ed., 563; Macmillan, Metas. Minn. Val., 36; Hitchcock, Ames Fl., 522.

A delicate species preferring shallow ponds and lakes. July.

Ames, abundant at Cairo Lake, *Hitchcock*; Muscatine, *Herb. Reppert*, No. 746 in part.

13. *P. SPIRILLUS* Tuck. Am. Jour. Sci. and Arts, 2nd Ser., VI, 226 (1848).

Morong, Naiad. N. A., 49; Wats. and Coult., Gray's Man., 6th ed., 560; Beal and Wheeler, Fl. Mich., 145; Bot. Death Val. Ex., 210.

This interesting little plant, not before reported from the State, was collected in August, 1889, at Carnsforth, Iowa, by Prof. Hitchcock, and again in July, 1894, by Mr. Kenneth McKenzie in ponds along the C., R. I. & P. R. R., between Muscatine and Fruitland. The specimens approach *P. diversifolius* Raf. (*P. hybridus* Michx.) in some characters, but are quite clearly distinguished by the submerged spikes being sessile or nearly so; by the broader submerged leaves, and by the curious snail-like fruit which shows the coiled embryo very conspicuously, even in the dried specimen.

14. *P. PECTINATUS* Linn. Spec. Pl., ~~127~~ (1753).

Morong, Naiad. N. A., 51; Wats and Coult., Gray's Man., 6th ed., 564; Macmillan, Metas. Minn. Val., 35; Arthur, Fl. Iowa, 30.

One of the most widely distributed species of plants, occurring in Europe, Asia, Africa, Australia, and the greater part of North America. Ponds and quiet streams. July, August.

West Fork of the Des Moines, Estherville, *Cratty*; Muscatine, *Reppert*; Woodbine, *Burgess*; Storm Lake, *Bessey*; Lake Okoboji, *Hitchcock*; Hancock and Linn counties, *Shimek*.

## JUNCAGINEÆ.

TRIGLOCHIN *Linn.* Sp. Pl., 339 (1753).

1. *T. MARITIMA* *Linn.* Sp. Pl., 339 (1753).

*T. elata* Nutt. Gen. l., 237 (1818).

*T. maritima*, var. *elata* Gray's Man., 2nd ed., 437 (1852).

Morong, Naiad. N. A., 8; Wats. and Coult., Gray's Man., 6th ed., 558; Arthur, Cont. Fl. Iowa, V.; Macmillan, Metas. Minn. Val., 41; Hitchcock, Ames Fl., 522.

Widely distributed throughout Canada and the northern half of the United States. Most common in salt marshes, but in the interior it is found in fresh water bogs. Our plant 2 to 3 ft. tall. July, August.

Ames, very rare, *Hitchcock*; bogs near Armstrong, Emmet county, infrequent, *Cratty*.

SCHEUCHZERIA *Linn.* Spec. Pl., 338 (1753).

1. *S. PALUSTRIS* *Linn.* Sp. Pl., 338 (1753).

Morong, Naiad. N. A., 9; Wats. and Coult., Gray's Man., 6th ed., 558; Arthur, Cont. Fl. Iowa, V.; Macmillan, Metas. Minn. Val., 42.

A rush-like perennial plant growing in cold bogs, and flowering early in ~~the spring~~ <sup>June</sup>, the fruit maturing in July. Only one species is known.

Emmet county, two miles north of Armstrong, very rare, *Cratty*. This is about its southern limit in the United States.

## ALISMACEÆ.

ALISMA *Linn.* Sp. Pl. (1753).1. A. PLANTAGO *Linn.* Sp. Pl., 342 (1753).

*A. plantago* var. *americana*, R. and S., Syst. III. (1818).

Wats. and Coult., Gray's Man., 6th ed., 554; Arthur, Fl. Iowa, 31; Hitchcock, Ames Fl., 522; Upham, Fl. Minn., 138.

Common throughout the State. The plant varies greatly, especially in regard to size and foliage, the result of different conditions of its place of growth. June, July.

Emmet county, *Cratty*; Iowa City and Cedar Rapids, *Macbride*; Decorah, *Holway*; Ames and Charles City, *Arthur*; Boone, *Bessey*; Muscatine, *Reppert*; Webster City, *Pammel*; Marshalltown, *Stewart*; Hamilton county, *Rolfs*; Fremont, Washington, Lee, Jackson and Scott counties, *Shimek*.

ECHINODORUS *Richard.* Mem. Mus., 365 (1815)1. E. ROSTRATUS (*Nutt.*) *Engelm.* Gray's Man., 2nd ed., 438 (1856).

*Alisma rostrata* Nutt.

Wats. and Coult., Gray's Man., 6th ed., 556; Hitchcock, Bull. Torr. Bot. Club, XVI., 70.

Ditches and swamps. Illinois to Iowa and southward; rather rare. August, September.

Hamburg, *Hitchcock*; Iowa City, *Macbride*; Muscatine, *Reppert*; Sioux City, *Pammel*; Keokuk, *Shimek*.

2. E. PARVULUS *Engelm.* Gray's Man., 2nd ed., 438 (1856).

Wats. and Coult., Gray's Man., 6th ed., 556; Arthur, Fl. Iowa, 31; Upham, Fl. Minn., 138; Beal and Wheeler, Fl. Mich., 145.

Rare or local. No. 786 of *Arthur's Flora of Iowa*, but without locality.

SAGITTARIA Linn. Sp. Pl. (1753).

1. S. ARIFOLIA Nutt. in Herb. J. G. Smith, Rev. N. A. Sag. and Loph., 6 (1894).

*S. sagittæfolia minor* Pursh., Fl. Am., II., 395 (1814).

A species widely distributed in the western half of the United States, but probably rare within our limits. In general appearance closely resembling form *c.* of *S. latifolia* Willd., but the fruit very different, long, winged on both sides, with a very short upright beak, and (in our plant) a prominent vertical sub-epidermal resin passage. Collected at Iowa City by Prof. Hitchcock. Herbarium of Iowa Agricultural College.

2. S. LATIFOLIA Willd. Sp. Pl., IV., 409 (1806).

*S. variabilis* Engelm. Gray's Man., 1st ed., (1848).

*S. sagittæfolia* Auc. Amer.

(?) *S. sagittæfolia* Linn. Sp. 993 (1753).

Smith, Rev. N. A. Sag. and Loph., 8; Wats. and Coult., Gray's Man., 6th ed., 554; Macmillan, Metas. Minn. Val., 45; Arthur, Fl. Iowa, 31; Hitchcock, Ames Fl., 522.

Very common throughout the State in sloughs and edges of ponds, lakes, and streams. Excessively variable in size, foliage, shapes of the achenia, etc. The typical plant has achenia obliquely or horizontally beaked, both of which forms are common within our limits. J. G. Smith in his recent monograph includes five forms of which form *a*, the var. *obtusa* Engelm., and form *c*, including the varieties *hastata*, *angustifolia*, *gracilis*, and *diversifolia* of most collectors are frequent.

Several species of *Sagittaria* produce tubers, especially *S. latifolia* and its various forms. These tubers are called Wabes-i-pin-ig, or swan potatoes, by the Chippewa Indians, because they furnish nourishment for the larger aquatic fowls. "These tubers sometimes attain the size of a small hen's egg and are then eaten by the Indians with whom they are a great favorite. In their raw state they contain a bitter, milky juice, but in boiling become sweet and palatable."—*Parry*.

Decorah, *Holway*; Emmet and Kossuth counties, *Cratty*;

Jones county, Cedar Rapids and Iowa City, *Macbride*: Ames, *Arthur*: Hamilton county, *Rolfs*: Muscatine, *Reppert*: Marshalltown, *Stewart*: Davenport and Waterloo, *Hitchcock*: Winnebago and Lee counties, *Shimek*.

3. *S. RIGIDA* *Pursh*. Fl. Am., 397 (1814).  
*S. heterophylla* *Pursh*. Fl. Am., 396 (1814), not of  
*Schreb.* Fl. Erl., II., 119 (1811).

Smith, Rev. N. A. Sag. and Loph., 23; Wats. and Coult., Gray's Man., 6th ed., 555; Hitchcock, Ames Fl., 520; Arthur, Cont. Fl. Iowa, III.

Edges of lakes or streams; rather common in the eastern and southern portions of the State. Very variable, especially in regard to size and foliage, July, August.

Clinton county, *Butler*: Ames, abundant at Cairo Lake, *Hitchcock*: Muscatine, in Muscatine slough at the upper bridge, five miles below the city, *Reppert*; Waterloo, *Hitchcock*: Linn county, *Shimek*. Specimens collected at Iowa City by Prof. Hitchcock have the submersed foliage closely resembling that of *S. teres* Wats.

4. *S. GRAMINEA* *Michx.* Fl. N. A., I., 190 (1803).

Smith, Rev. N. A. Sag. and Loph., 24; Wats. and Coult., Gray's Man., 6th ed., 555; Arthur, Fl. Iowa, 31; Hitchcock, Ames Fl., 522; Webb, Fl. Neb., 97.

Southeast portion of the State; ponds and streams. July.

Ames and Boone, *Bessey*; Hamilton county, *Rolfs*; Iowa City, *Macbride*; Muscatine, *Reppert*; Nevada, *Fragier*; Carnsforth, *Hitchcock*, a form approaching *S. cristata*.

5. *S. CRISTATA* *Engelm.* in Arthur, Cont. Fl. Iowa, V., (1882).  
 Proc. Dav. Acad. Sci., IV., 29 (1886).

*S. variabilis* var. (?) *gracilis*, S. Watson in Gray's Man., 6th ed., 555, in part, not of Engelm.

Smith, Rev. N. A. Sag. and Loph., 27; Sheldon, Minn. Bot. Studies, Bull. 9. pt. II.

Monœcious aquatic, rooting in the sand or mud in water a

few inches to several feet deep, 6 in. to 2 ft. high; petioles about equaling the scape in height, the leaf slightly resembling the petiole in form and structure, 3 to 5 in. long, linear or linear lanceolate, thick, spongy, somewhat triangular in cross section, and when flattened in the herbarium specimen, appearing more nearly lanceolate in form. Submerged phyllodia linear or linear lanceolate, acute or obtuse, 4 to 8 in. long, rigid, with about five principal and many intermediate nerves, coarsely reticulated, clustered at the base of the plant, and appearing in tufts from the nodes of the stolons by means of which the plant is propagated, and which extend for a considerable distance along the muddy bottom. Scape slender, bearing 4 to 6 whorls of flowers, rarely more than the lower whorl fertile; pedicels of sterile and fertile flowers about equal,  $\frac{3}{4}$  to 1 in. long, bracts connate, acute or slightly obtuse; petals white, delicate, wavy; filaments pubescent, thickened below, longer than the anthers. Fruit heads  $\frac{1}{2}$  to  $\frac{3}{4}$  in. in diameter, shrinking much in drying; achenia obovate with a conspicuous horizontal style, and crested back and sides.

The type specimens of this plant with flowers and mature fruit were collected by the writer in a small lake, since dried up, one mile east of Armstrong, Emmet county, Iowa, in August, 1881, and were sent to Dr. Geo. Engelmann for determination. In his reply he stated that while it was closely allied to *S. graminea* Michx., he could not decide definitely in regard to it without thoroughly revising the genus. However, under date of March 5, 1882, he sent to Dr. Arthur the provisional name *S. cristata*, which was published with a few lines of description in Arthur's *Contribution to the Flora of Iowa* as above noted. The late Dr. Morong, who studied the plant critically, considered it a good species, and it is so regarded in J. G. Smith's recent monograph. Plants collected at Ames and Carnsforth, and conjectured to be this species, are best considered as forms of *S. graminea* Michx.

Besides the locality above given, the plant has also been found in several places in Minnesota. See Sheldon in *Minn. Bot. Stud., Bull.* 9, pt. II.



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LOPHOTOCARPUS *T. Durand.* Index Gen.  
Pl., 627 (1888).

- I. L. CALYCINUS (*Engelm.*) *J. G. Smith* in Mem. Torr. Bot. Club, V., 25 (1894).  
*Sagittaria calycinus* Engelm. in Torr., Bot. Mex. Bound., 212 (1858).

Wats. and Coult., Gray's Man., 6th ed., 556; Cont. to U. S. Nat. Herb., II., 455.

Not before reported from the State and very rare within our limits.

. Muscatine, margin of a pond just above the city, *Reppert*.

HYDROCHARIDACEÆ.

ELODEA *Richard.* Mich., Fl. Bor. Am., I., 20 (1803).

- I. E. CANADENSIS *Rich. and Michx.* Fl. N. Am., I., 20 (1803).  
*Anacharis canadensis* Planch. Ann. Mag. and Nat. Hist., 2nd Ser., I., 86 (1848).

Wats. and Coult., Gray's Man., 6th ed., 496; Arthur, Fl. Iowa, 31; Upham, Fl. Minn., 139.

Frequent throughout the State in slow-flowing streams. The staminate flowers are very rarely seen. A few were collected by the writer near Armstrong, in July, 1882.

Emmet county, *Cratty*; Iowa City, *Macbride*; Decorah, *Holway*; Ames and Charles City, *Arthur*; Ft. Dodge, *Bessey*; Spirit Lake, *Hitchcock*; Muscatine, *Reppert*; Hancock county and Cedar Rapids, *Shimek*.

VALLISNERIA *Linn.* Sp. Pl. (1753).

- I. V. SPIRALIS *Linn.* Sp. Pl., 1015 (1753).

Wats. and Coult., Gray's Man., 6th ed., 496; Arthur, Fl. Iowa, 31; Macmillan, Metas. Minn. Val., 46.

Rather rare in ponds and lakes, or slow streams. August.

Independence, Bluffton and Iowa City, *Macbride*; Iowa Lake, Emmet county, *Cratty*; Ames and Storm Lake, *Bessey*; Mud Lake, Story county, *Hitchcock*; Mason City, *Shimek*.